NPIC/TSSG/RED-1760-69
20 August 1969

MEMORANDUM FOR: Special Assistant for Plans & Applications, RED/TSSG

SUBJECT: Review of Solid State Image Intensifier Development

1. The attached documents have been reviewed from the standpoint of determining whether the Solid State Image Intensifier development conducted by the [redacted] warrants a closer examination by TSSG/RED.

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2. For background purposes, the solid state image intensifier may be described as two capacitive-resistance type circuits in series or, more simply, a photoconductive element in series with an electroluminescent element driven by an AC voltage. When the photoconductive element is illuminated, its resistance decreases, the voltage across the electroluminescent element then increases and the output light is increased.

3. Referring to the Final Report prepared for the Naval Training Device Center (NAVTRADEVCEN 66-C-0064-2), it is noted that 10" X 10" image intensifier panels appear to be the largest practical size capable of being manufactured at the present time. Larger panels (30" X 40") could be fabricated, but the initial tooling cost would be prohibitively high. Consequently, a modularized approach has been preferred. An undesirable feature of this approach is the visible joint (about 0.03") along the edges of the modules.

4. A maximum standard luminous gain output of about 10 foot-lamberts per foot-candle input has been achieved using 2870 degree Kelvin color temperature input light to realize 3200 degree Kelvin output light. Luminous gains up to 100 foot-lamberts per foot-candle input were measured with lower color temperature projection lamps.

5. The resolution of the screens developed for the Naval Training Device Center was ultimately raised to 180 lines per inch (3½ line pairs per millimeter). It was stated that a higher resolution might be realized through a trade-off by reducing the gain.

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6. Difficulties in manufacture presently limit the half life of the image intensifier panels to 100 hours. However, by use of somewhat tedious additional precautions, a half life of 300 hours is envisioned.

7. It should be noted that practical use of the present panels is limited to ambient illumination conditions of about 10 foot-candles.

8. Theoretically, the image intensifier panels would appear to be the ideal method for increasing the luminous gain of a viewing screen. However, referring to the characteristics outlined in paragraph 3 through 7, it becomes evident that a number of the desirable qualities required in practical precision viewing devices are lacking in the present panels. It is conceded that continued development of the panels might result in correction of some of these undesirable qualities but, as is pointed out in one of the documents, a major breakthrough in the photoconductive and electroluminescent materials is required.

9. Considering the present state-of-the-art, the relatively slow progress made in developing the photoconductive-electroluminescent type image intensifier since its invention in 1952, the probable high cost of continued development and the marginal chance of realizing a practicable end product, it would appear that a prudent approach toward this development is called for. In this respect, it is not considered that a visit to the contractor's plant is warranted at this time. We should, however, continue to monitor progress in this field through appropriate literature acquisition.

[redacted]

SRB/RED/TSSG

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Attachment: a/s

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